Directionality of the Association Between Social Support and Posttraumatic Stress Disorder: A Longitudinal Investigation[1]

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This study examined the nature of the association between social support and posttraumatic stress disorder (PTSD) symptomatology among 2,249 male veterans of the 1990-1991 Gulf War. Using structural equation modeling, a cross-lagged panel analysis indicated a strong negative relationship between PTSD at Time 1 and social support at Time 2, while social support at Time 1 did not predict PTSD at Time 2. Findings suggest that, over time, interpersonal problems associated with PTSD may have a detrimental influence on the quality and quantity of available social support resources. It is recommended that greater focus be placed on the interpersonal skills of those suffering from PTSD.

Numerous studies have documented an association between lower levels of social support and poorer health (for a review, see Cohen & Wills, 1985). In the area of trauma, low social support has been associated with higher

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levels of posttraumatic stress disorder (PTSD) in both civilian community (e.g., Davidson, Hughes, Blazer, & George, 1991; Kaniasty & Norris, 1993) and military (e.g., Keane, Scott, Chavoya, Lamparski, & Fairbank, 1985; King, King, Fairbank, Keane, & Adams, 1998) samples. Such findings often are interpreted as evidence that social support protects against the deleterious consequences of trauma or counteracts or reduces PTSD symptomatology over the course of time. However, a reliance on cross-sectional research designs has limited the ability of researchers to definitively demonstrate the directionality of this relationship.

It is possible that the association between social support and PTSD can be accounted for partially by the interpersonal difficulties that accompany PTSD. Studies of military veterans have demonstrated that those with PTSD tend to have interpersonal problem-solving deficits, difficulties with intimacy and sociability, marital distress and relationship abuse, and parenting difficulties (Beckham, Lytle, & Feldman, 1996; Byrne & Riggs, 1996; Jordan et al., 1992; Roberts et al., 1982; Ruscio, Weathers, King, & King, 2002; Solomon & Mikulincer, 1987). Therefore, it is plausible to hypothesize that PTSD may exert a negative impact on the availability and quality of social support among this population.

Some evidence for this hypothesis was provided in a cross-sectional study of Vietnam veterans by Keane et al. (1985). Retrospective ratings of perceived levels of social support prior to entering the military, shortly after discharge, and at the time of the assessment indicated a decline in social support for veterans with PTSD, while the perceived social support of a comparison group remained stable or improved over time. As these authors cautioned, however, the use of retrospective reports tempered conclusions drawn regarding how the relationships among variables unfolded over time.

In the present study, we use longitudinal data and a cross-lagged panel structural equation modeling analysis to examine the directionality of the association between social support and PTSD symptom severity among a sample of male Gulf War veterans assessed approximately 2 and 7 years after war-zone exposure. We test two competing hypotheses:

> *Hypothesis 1.* Social support at the first assessment point will predict later PTSD symptom severity, consistent with the notion that social support reduces the negative impact of stress and trauma.
>
> *Hypothesis 2.* PTSD symptom severity will predict subsequent levels of social support, given the aforementioned findings of interpersonal difficulties associated with PTSD.

Method

Participants

Data were drawn from 2,249 male U.S. Army personnel who participated in the Fort Devens Operation Desert Storm Reunion Survey, a large-scale longitudinal study designed to measure war stressors and their effects following the 1990-1991 Gulf War. Approximately 60% of the military deployed from and returning to Fort Devens, Massachusetts, participated in this study. Those not participating were unavailable because of other out-processing duties during survey administration.

For the current study, data from two separate time points were used. Time 1 data were collected from 1992-1993, which was 18 to 24 months following participants' return to the United States from the Gulf War. Given the time lag between deployment and the Time 1 assessment, PTSD and social support levels do not represent the initial impact of trauma severity. Time 2 data were collected approximately 5 years after the Time 1 assessment, from 1997 to 1998.

Upon their return from the war zone and entry into the longitudinal study, our sample had a mean age of approximately 30 years. The sample was 91% Caucasian, and participants' mean level of education was slightly over 13 years. As noted by Sharkansky et al. (2000), when compared to the population of all Gulf War veterans, this sample was somewhat older and more likely to have been deployed from the Reserves or National Guard than from active duty units. They were quite comparable to the population of Gulf War veterans with regard to education and marital status. Extensive details on this sample and the larger study are reported in a number of other publications (e.g., Erickson, Wolfe, King, King, & Sharkansky, 2001; King et al., 2000; Wolfe, Erickson, Sharkansky, King, & King, 1999).

Measures

PTSD symptom severity. PTSD symptom severity was assessed at both time points with the PTSD Checklist (PCL; Weathers, Litz, Herman, Huska, & Keane, 1993). The PCL consists of 17 self-report items that correspond with each PTSD symptom as listed in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association [APA], 1994). Respondents rated how much they have been bothered by each symptom over the previous month on a 5-point scale ranging from 1 (*not at all*) to 5 (*extremely*). The measure has been found to exhibit sound psychometric properties (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996;

Weathers et al., 1993). In the present study, the internal consistency reliability estimate (Cronbach's alpha) for the PCL was .94 at both Time 1 and Time 2.

Social support. Social support at Time 1 was assessed using a 10-item scale adapted from the National Vietnam Veterans Readjustment Study (NVVRS; Kulka et al., 1990). This measure asks participants about their emotional and instrumental support; for example, if they "have friends or relatives to talk to about problems" (emotional item) or to "drive them to the doctor if needed" (instrumental item). Each item is answered using a dichotomous (*Yes*/*No*) response format. The internal consistency estimate for this sample was .89.

At Time 2, a six-item version of RAND's Medical Outcome Study (Stewart, Hays, & Ware, 1988) social support scale was used. This scale similarly evaluates components of emotional and instrumental support and closely parallels the other social support measure in content. Respondents were asked the degree to which different kinds of support are available. Sample items include "someone to turn to for suggestions about how to deal with a personal problem?" (emotional item) and "someone to take you to the doctor if you needed it" (instrumental item). Individual items were rated on a 5-point scale ranging from 0 (*none of the time*) to 4 (*all of the time*). The internal consistency reliability coefficient in the present study was .93.

Analyses

Descriptive statistics and intercorrelations for all study variables were computed. Structural equation modeling (SEM) then was used to conduct a cross-lagged panel analysis. There were four latent variables. Time 1 PTSD and Time 2 PTSD each had four manifest indicators formed by clustering items from the PCL according to DSM-IV (APA, 1994) Criteria B (reexperiencing), C1 (avoidance), C2 (numbing), and D (hyperarousal) symptom categories (King, Leskin, King, & Weathers, 1998). Time 1 social support and Time 2 social support each had two manifest indicators, formed by clustering items on emotional and instrumental support. A structural model evaluated the cross-lagged relationships between PTSD and social support using LISREL 8.5 (Jöreskog & Sörbom, 2001).

The structural model included two multiple regression equations: Time 2 PTSD regressed on Time 1 social support and Time 1 PTSD (addressing the influence of social support on the course of PTSD symptom severity; Hypothesis 1), and Time 2 social support regressed on Time 1 PTSD and Time 1 social support (addressing the influence of PTSD symptom severity on subsequent levels of social support; Hypothesis 2). The two Time 1 variables

were allowed to covary, as were the residuals in the regressions of each of the two Time 2 variables on the Time 1 variables. In addition, in the measurement component, residual variances of the four like manifest indicators of PTSD were allowed to covary over the two occasions (e.g., the residual variance of reexperiencing at Time 1 with the residual variance of reexperiencing at Time 2).

The full information maximum likelihood estimator (FIML) was employed to accommodate incomplete data. According to contemporary thinking about the treatment of missing data (see sequence of *Psychological Methods* articles by Collins, Schafer, & Kam, 2001; Enders, 2001; Sinharay, Stern, & Russell, 2001; West, 2001), FIML is most appropriate when the missing-data mechanism is deemed ignorable (Graham & Hofer, 2000), recoverable (McArdle, 1994), or missing at random (Little & Rubin, 1987). This condition obtains when the cause of missingness can be explained by variables under consideration, a likely circumstance for most situations, and not by variables unmeasured or unavailable to the research. While the latter condition is admittedly probabilistic, it is a reasonable assumption (Graham, Hofer, Donaldson, MacKinnon, & Schafer, 1997; King, King, Bachrach, & McArdle, 2001; Little & Rubin, 1987; Schafer & Graham, 2002) and one that guided analyses in this study.

At Time 1, sample size was 2,249; while at Time 2, sample size was 1,285: a 43% reduction. Covariance coverage values across the 12 manifest indicators ranged from .41 to .87, well above the .10 minimum suggested by Muthen and Muthen (2002). A variable created to index missingness at Time 2 correlated quite low with both PTSD at Time 1 and social support at Time 1 (.05 and -.07, respectively). By implementing FIML, the effective sample size for the SEM analysis was retained at 2,249.

Results

Table 1 contains means, standard deviations, and intercorrelations for total scores on the PTSD and social support measures at Times 1 and 2. Again, since the Time 1 assessment was conducted 18 to 24 months after participants' return from the Gulf War, scores for PTSD and social support may not represent the impact of initial trauma severity. Intervening variables (e.g., other stressful events, substance abuse) could have impacted PTSD and social support at Time 1. Employing equality constraints in a structural modeling context, mean total score on PTSD increased across time, $\chi^2(1, N = 2{,}249) = 315.17$, $p < .001$; with an accompanying increase in dispersion, $\chi^2(1, N = 2{,}249) = 177.85$, $p < .001$. Means and standard deviations for social support reflect different metrics and cannot be compared

Table 1

Descriptive Statistics and Intercorrelations for Study Variables

Variable	*M*	*SD*	1	2	3
1. Social support, Time 1	8.12	3.21	—		
2. Social support, Time 2	17.70	6.55	.26	—	
3. PTSD, Time 1	24.66	9.90	-.18	-.21	—
4. PTSD, Time 2	30.69	13.20	-.21	-.32	.63

Note. PTSD = posttraumatic stress disorder. $p < .001$ for all associations.

directly. At the bivariate level, all of the measures were significantly intercorrelated in the expected direction.

Findings from the SEM analysis are displayed in Figure 1, where values are covariances (curved, double-headed arrows between synchronous or same-occasion latent variables) and unstandardized regression coefficients (remaining straight-lined, single-headed arrows). As expected and consistent with the bivariate results, PTSD at Time 1 was negatively associated with social support at Time 1; and the residuals in the Time 2 regressions likewise were negatively associated. Moreover, PTSD at Time 1 was associated with PTSD at Time 2, and social support at Time 1 was associated with social support at Time 2, with critical ratios exceeding the 2.00 standard proposed by Jöreskog and Sörbom (1993).

Importantly, the critical ratio (CR) for the regression of social support at Time 2 on PTSD at Time 1 (CR = -3.76, β = -.14) also exceeded 2.00, yet that for the converse relationship between PTSD at Time 2 and social support at Time 1 (CR = -1.16, β = -.04) did not exceed this standard. Hence, there is a stronger PTSD to social support effect than social support to PTSD effect[3]; this model, $\chi^2(47, N = 2{,}249) = 817.89$, $p < .001$. The root mean square error of approximation (RMSEA; Steiger, 1990) was .085, with a 90% confidence interval of .080 to .091, indicating acceptable fit (Browne & Cudeck, 1989). The comparative fit index (CFI; Bentler, 1990) was .93; the corrected goodness-of-fit index (Jöreskog & Sörbom, 2001; Steiger, 1990) was .95; and the non-normed fit index (NNFI; Bentler & Bonett, 1980;

[3]We also carried out similar cross-lagged analyses with social support disaggregated into its emotional and instrumental components. In each case, the pattern of results was consistent with those reported for social support as a composite latent variable. The PTSD to social support (emotional or instrumental) coefficient was stronger than that of its cross-lagged counterpart. Tables of these supplementary findings are available upon request from the first author.

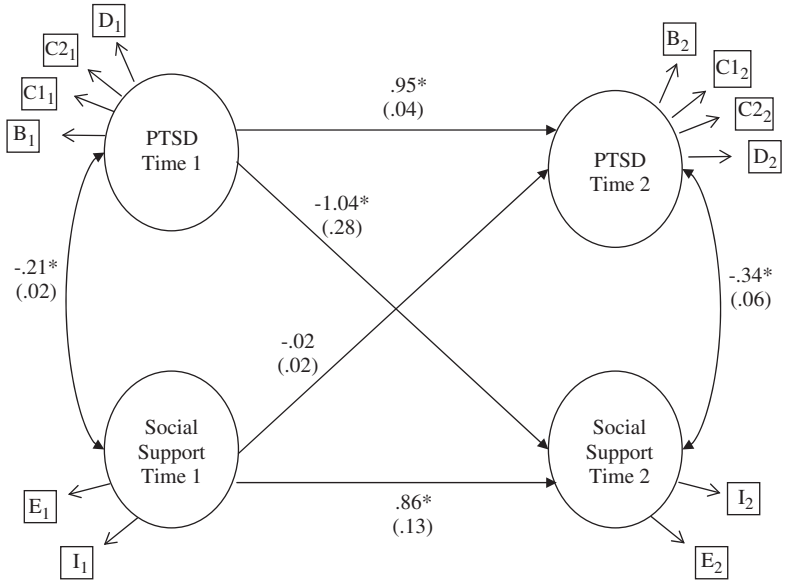

Figure 1. Simplified model of associations among PTSD symptom severity and social support at Times 1 and 2. Regression coefficients are unstandardized and, therefore, may exceed 1.00, as is the case for the relationship between PTSD symptom severity at Time 1 and social support at Time 2. Standard errors are shown in parentheses. Not shown are intercepts and residuals in the measurement model and factor means and variances in the structural model. B_1 and B_2 = re-experiencing mean item cluster scores at Times 1 and 2; $C1_1$ and $C1_2$ = avoidance mean item cluster scores at Times 1 and 2; $C2_1$ and $C2_2$ = numbing mean item cluster scores at Times 1 and 2; D_1 and D_2 = hyperarousal mean item cluster scores at Times 1 and 2; E_1 and E_2 = emotional social support mean item cluster scores at Times 1 and 2; I_1 and I_2 = instrumental social support mean item cluster scores at Times 1 and 2. *Critical ratio exceeds 2.00.

Tucker & Lewis, 1973) was .90. Since the structural model was fully saturated, the source of misfit was likely in the measurement component.

Discussion

As noted previously, most studies of military veterans have used cross-sectional data to describe the relationship between PTSD and social support (e.g., Keane et al., 1985; King et al., 1998). Therefore, conclusions regarding causality have been tempered by ambiguity about direction of influence. Using a cross-lagged panel SEM analysis and data from two time points, we were able to establish more firmly the temporal relationship between these two factors. The results of the current study are more consistent with Hypothesis 2, that PTSD symptom severity negatively affects social support

prospectively; rather than Hypothesis 1's more traditional assumption that low levels of social support prevent recovery, contribute to chronicity, or exacerbate symptom severity across the course of the disorder.

These results may appear to be counter to the way many researchers perceive the association between PTSD and social support. However, they are consistent with one cross-sectional study that suggested a decline in social support over time for military veterans with PTSD (Keane et al., 1985), with other studies that generally have not supported the buffering hypothesis for combat-related traumas (Ren, Skinner, Lee, & Kazis, 1999), and with some longitudinal research that has demonstrated reductions in perceived social support following exposure to natural disasters (Kaniasty & Norris, 1993; Norris & Kaniasty, 1996). Moreover, these findings should not be surprising when one considers the symptomatology of PTSD and interpersonal difficulties commonly associated with the disorder.

Many symptoms of PTSD directly indicate interpersonal difficulties, such as feelings of detachment from others and angry outbursts (APA, 1994), and studies often have shown those with PTSD to be at greater risk for a variety of interpersonal difficulties (Beckham et al., 1996; Byrne & Riggs, 1996; Jordan et al., 1992; Roberts et al., 1982; Solomon & Mikulincer, 1987).[4] Taken together, available evidence has suggested that individuals with chronic PTSD may be likely to drive away others within their social support network. Although some critical forms of social support are likely quite helpful in the immediate aftermath of a trauma, our findings indicate that unyielding PTSD symptomatology erodes social support over time.

Our results may have important clinical implications. Perhaps greater focus should be placed on the cultivation and development of interpersonal skills among combat veterans suffering from PTSD. Issues associated with relationship difficulties and family problems, including the presence of physical and psychological abuse, should be explored fully and targeted in PTSD interventions. Such problems may lead not only to reduced social support for the veteran, but also may have a multitude of other negative outcomes for the veteran's family (Gelles & Harrop, 1989). It is also likely that interpersonal problems and a lack of social support mediate the associations commonly revealed between PTSD and other mental and physical difficulties (e.g., Schnurr, Spiro, & Paris, 2000). Consistent with the social

[4]Although one could suspect a possible conflation of social support and emerging PTSD 18 to 24 months after exposure, the use of multiple regression analysis in a cross-lagged panel design precludes such a conclusion. Indeed, this approach yields unique or partialed effects of each predictor on the outcome. In other words, the effect of Time 1 PTSD on Time 2 social support is net of the effect of Time 1 social support; that which the two independent variables have in common has been removed.

support deterioration deterrence model (Norris & Kaniasty, 1996) developed in the context of natural disasters, the deleterious impact of PTSD on health may be lessened by efforts to enhance social support.

Some limitations of this study bear note. First, different social support measures were used at the two time points. A threat to the validity of this design would surface if the RAND Medical Outcomes Study (Stewart et al., 1988) social support measure used at Time 2 were associated more strongly with PTSD than the NVVRS (Kulka et al., 1990) social support measure used at Time 1. Consideration of the correlations among the latent variables reveals that this is not likely. In fact, the synchronous correlation between the latent variables representing Time 2 social support and Time 2 PTSD (-.32), and the cross-lagged correlation between Time 2 social support and Time 1 PTSD (-.24) were lower than the parallel synchronous correlation between Time 1 social support and Time 1 PTSD (-.39), and the cross-lagged correlation between Time 1 social support and Time 2 PTSD (-.31). Future studies should use equivalent measures prospectively to elucidate further the associations between PTSD and social support over time.

Future investigations also should assess for pretrauma social support, as well as prior trauma histories. It is possible that a lack of social support prior to the cardinal stressor may serve as a vulnerability factor for the development of PTSD. That is, participants who experienced PTSD symptomatology may have been lower on social support prior to trauma exposure during their Gulf War deployment. Relatedly, because longitudinal data in this study were collected at time points distant from the initial posttrauma period, the data presented here speak to factors contributing to the course of PTSD over time, and not its etiology.

A final comment relates to the generalizability of the findings. It is important to examine prospectively the association between PTSD and social support with other trauma populations, especially female trauma victims. There is some evidence (e.g., King, King, Foy, Keane, & Fairbank, 1999) that this relationship is more salient for women than for men.

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